DOCUMENT RESUME

ED 385 312 JC 950 381

AUTHOR Windham, Patricia
TITLE The Importance of Work and Other Factors to Attrition: A Comparison of Significancy and Odds Ratios for Different Outcomes.
PUB DATE Aug 95
NOTE 20p.; Paper presented at the Annual Conference of the Southeastern Association for Community College Research (24th, Asheville, NC, August 6-9, 1995).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Persistence; Attendance; College Transfer Students; Community Colleges; Dropout Research; *Dropouts; High Risk Students; Minority Groups; Nontraditional Students; *Predictor Variables; School Holding Power; *Student Attrition; Two Year Colleges; *Two Year College Students

ABSTRACT

In order to gather data on the causes of student attrition, a study was conducted at a Florida community college to identify the relative importance of a set of selected environmental factors and student characteristics. A cohort was developed from the fall 1990 first-time-in-college students and was tracked for 2 years using the college's standard student level record system and the Florida Education and Training Placement Information Program, a state-level follow-up system. Study results included the following: (1) fall 1990 grade point average (GPA) and the student's mathematics placement score were the most consistently significant variables throughout the study; (2) students working full-time were between 2 and 3 times more likely to drop out than students not working full-time; (3) students taking college preparatory courses were about twice as likely to drop out as those not taking college preparatory courses; (4) beginning college with a regular high school diploma was very important the first year, while the ability to attend full-time was important the second year; (5) students most likely to remain enrolled either at the community college or in higher education were young, were employed part-time, were attending college full-time, and had a high school diploma and good GPA; and (6) students least likely to return were older students, were working full-time, were attending college part-time, and had taken college preparatory courses the first semester. Contains eight references. (MAB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 385 312

The Importance of Work and Other Factors to Attrition:

A Comparison of Significancy and Odds Ratios for Different Outcomes

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
P. Windham
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC).

Southeastern Association for Community College Research
Twenty-fourth Annual Conference
August 6-9, 1995
Asheville, North Carolina

BEST COPY AVAILABLE

presented by

Patricia Windham, Ph.D.
Coordinator of Planning and Research
Tallahassee Community College
Tallahassee, Florida

JC 950 381

BEST COPY AVAILABLE

The Importance of Work and Other Factors to Attrition:

A Comparison of Significance and Odds Ratios for Different Outcomes

Introduction

As Russell Edgerton stated in the September 1994 issue of the AAHE Bulletin, "New demographics, changes in family life, and the awesome power of the mass media have altered the characteristics of the student body we have been used to." Nowhere are those changes more dramatic than at the community college level, which has become the major entry point for minorities and returning older students. Community colleges are being asked to serve a different clientele than twenty years ago, with accompanying different learning styles. Regardless of what other characteristics these different segments of the current community college student body have in common, to be successful in higher education they must remain enrolled.

The focus of retention investigation has shifted during the past two decades from "who has remained in college" to "why they have remained" (Tinto, 1987; Bean and Metzner, 1985). The new focus on why students remain enrolled has resulted in the investigation of environmental factors as well as the examination of more general student characteristics. However, since each college serves a unique mix of students, each college must investigate what is influencing attrition at its campus and not rely exclusively on general theories.

The purpose of this investigation was to identify the relative importance to student attrition of a selected set of environmental factors and student characteristics at one public community college. The factors were selected from a larger group of factors, identified in a national sample, that had been shown to be significantly related to attrition. The college under consideration is one of twenty-eight in the public community college system of Florida. This system was established

to serve those students who, for whatever reason, were not able to participate fully in a university setting. Access has been made available via an "open door" policy, and while this has exposed more individuals to higher education, it has been accompanied by low graduation rates.

Improving the processes that allow students to remain enrolled is a primary means of improving the graduation rate of a college. This improvement requires understanding the factors that contribute to student attrition and determining how they are related to one another. Intervention strategies that could reduce attrition can be investigated, once significant factors are identified.

Basis of Study

It has become increasing clear over the past two decades that the process of leaving a college is a complex one (Tinto, 1975; Bean and Metzner, 1985). Many different factors contribute to the final decision to leave. This decision can be viewed as either positive or negative. If the student has obtained his educational goals, leaving may be the most appropriate choice. However, if the goals have not been obtained, then the leaving could be classified as "dropping-out." The important factor is to divide dropouts into those cases for which an institution might be able to offer assistance and those that are not under institutional control (Tinto, 1982).

A cohort was developed from the fall 1990 first-time-in-college students (Windham, 1994), in order to better understand what factors were influencing attrition at the public community college under consideration. Florida was the first state in the country to develop a state level follow-up system using unemployment compensation records. This follow-up system could be used to determine if selected individuals were employed during a specific quarter of the year,

their occupation and the amount of money earned. It also contained information on enrollment in all public and several private higher education institutions. By combining the resources of both the college's standard student level record system and the Florida Education and Training Placement Information Program (FETPIP) follow-up system, a unique file was built that contained not only the traditional retention information, but also information on employment and/or transferring to other institutions of higher education. The follow-up period was for two years.

Development of the Data File

The data file contained demographic, academic and environmental attributes. The demographic and academic attributes were age, race, sex, fall 1990 grade point average (GPA), fall 1991 GPA where possible, scores on the three subtests - mathematics, writing and reading - of the MAPS placement tests, full-time/part-time enrollment status, whether or not the student was enrolled in a college preparatory class the first semester, financial aid status, student initial intent coded as AA or other, and the type of high school certification earned coded as a diploma or GED. Environmental items were taken from the results of the FETPIP follow-up. They were whether or not the student was employed in fall 1991 and/or fall 1992, and whether or not the employment was full-time. Full-time employment was calculated using the algorithm defined by FETPIP. If a person worked at least twelve weeks in the quarter being tracked and earned at least $2040, they were considered to be working full-time.

After tracking the student for two years, it was possible to classify each student as having either dropped out after fall 1990 - the first fall, dropped out after fall 1991 - the second fall, transferred to another institution of higher education, stopped out, or continuously enrolled. These five outcomes were combined into the dependent variable labeled INDEX.

Table 1 provides a list of the variables included in the study, definitions and a profile of the fall 1990 cohort that was tracked.

Table 1

Variable Name, Definition, and Cohort Profile

(N=1425)

Independent

RACE	White, Black or Other	White 75.5%, Black 20.5%, Other 4.0%
SEX	Male or Female	Male 48.7% Female 51.3%
AGE	Age during fall 1990	Mean 20.2
DIP	High School diploma or GED	Diploma 97.3% GED 2.7%
PMATH	Score on mathematics portion of placement test	Mean 210.0
PWRITE	Score on writing portion of placement test	Mean 34.5
PREAD	Score on reading portion of placement test	Mean 15.9
GPA1	Grade point average as of fall 1990	[1]
GPA2	Grade point average as of fall 1991	[1]
PREP	Taking a college prep course fall 1990	Yes 50.2% No 49.8%
FATYPE	Receiving financial aid	Yes 15.2% No 84.8%
FTPT	Full-time or part-time enrollment for fall 1990	FT 33.7% PT 66.3%
INTENT	Degree intent - AA or other	AA 90.5% Other 9.5%
FOUNDEM1	Employed in fall 1991	Yes 58.3% No 41.5%
FOUNDEM2	Employed in fall 1992	Yes 60.5% No 39.5%
EMPFT1	Employed full-time in fall 1991	Yes 20.1% No 79.9%

Table 1 continued

EMPFT2	Employed full-time in fall 1992	Yes 26.6% No 73.4%
	Dependent (Categories of INDEX)	
REMAIN	Present in fall 1990, fall 1991 and fall 1992	40.8%
DROP1	Not present fall 1991 or fall 1992	26.9%
DROP2	Not present fall 1992	13.0%
TRANS	Transferred to another institution of higher education	12.7%
STOP	Not present in fall 91 but returned in fall 1992	6.7%

1. The mean GPA is not reported because students receive zero grade points for college prep courses as well as failing to pass a course. Some students take only college prep courses their first semester, and thus the mean GPA based upon this data set, which does not distinguish between these two groups, would have been artificially deflated.

Statistical Method

The statistical method used to develop a functional relationship between the independent variables and the outcomes was logistic regression. This procedure had been specifically designed to deal with the situation of a categorical outcome variable (Demaris, 1992). The most common use of logistic regression is when the dependent variable assumes only two values. However, techniques have been developed for dealing with categorical outcomes that assume more than two values.

When using the logistic technique, a dependent variable with k categories may be modeled using either the polytomous logistic regression procedure or with k-1 equations, each providing information about an outcome and the common reference category (Hosmer and Lemeshow, 1989). The version of the LOGISTIC procedure used in this study did not provide the option of

polytomous logistic regression. Therefore, a new set of outcome variables was derived. Using a derived set of outcomes was almost as efficient as using a polytomous procedure (ibid, p 230).

The results of interest in this study were both the significant variables in these equations and the odds ratios derived from the coefficients of the significant variables. For a categorical variable, the odds ratios indicate the expected probability of a student with a trait achieving the parameterized outcome compared to the expected probability of a student without a trait achieving the same outcome. For a continuous variable, the odds ratios indicate the change in the probability ratio of a student achieving the parameterized outcome for each unit change in the variable. The odds ratios presented in the accompanying tables are based upon the metric of the respective variable. The standardized odds ratios included in the text were calculated to allow direct comparisons among the continuous variables by indicating the change in the odds ratios for a one standard deviation change in the variable.

Since the purpose of this study was to investigate factors that influenced attrition, remaining in school, REMAIN, was chosen as the common reference category and was coded as 0. This coding scheme meant that an increase in the value of a significant variable with an odds ratio less than one implied an increase in the odds of remaining in school versus the other outcome, while an increase in the value of a significant variable with an odds ratio greater than one decreased the probability of remaining enrolled. The same main effects and interactions were used in a full-model analysis for each of the designated outcomes.[1]

When individual equations were developed for a polytomous outcome variable, one would expect coefficients to change among the equations. In addition, there was the possibility that the significant variables would also change among the equations. That was what occurred in these

analyses.

Significant Variables

Several interactions were entered into the logistic regression procedure in addition to the independent variables listed in Table 1. These interactions were race by sex, race by receiving financial aid, race by full-time/part-time, race by taking college prep, sex by receiving financial aid, sex by full-time/part-time, and taking college prep by receiving financial aid. These interactions were chosen based upon previous analyses conducted at the college under consideration and the review of important factors at other two-year colleges throughout the nation.

DROP1 Results

The results for dropping out after the first fall, DROP1, versus REMAIN, indicated that age, fall 1990 - first term GPA, mathematics placement score, type of high school certification, taking college preparatory classes, employment, full-time employment and the race by full-time/part-time interaction were significant.

Analysis of the interaction was conducted via a two stage process. Initially the global effect was tested for significance. Only if the global effect was found to be significant were the individual contrasts tested. The chi-squared value of the global effect of race by full-time/part-time was only 0.945 which was not significant for two degrees of freedom. No further analyses were conducted. The remaining main contrast that needed to be calculated was black versus Other. The contrast was computed and found to be non-significant.

The odds ratio for a unit change in age was 1.04. This indicated an increased likelihood of dropping out as age increased. For first term GPA the odds ratio was .55, indicating that each unit increase in GPA decreased the odds of dropping out by almost fifty percent. The odds ratio

for the mathematics placement score was approximately that of age, but in the opposite direction. As the score on the mathematics portion of the MAPS increased, the odds of dropping out compared to remaining enrolled declined. The standardized odds ratios for age, first term GPA and mathematics placement score were 1.14, .63 and .84 respectively. Thus, the effect of GPA was more pronounced than either age or mathematics placement score.

A standard high school diploma was very important in terms of remaining enrolled. The odds ratio for type of high school certification indicated that a student with a regular high school diploma was only about one-fifth as likely to drop out as a student with a GED. Employment per se had a positive effect with an employed student being about half as likely to drop out as an unemployed student. Both taking college preparatory classes and full-time employment indicated substantial negative effects. The odds ratio for taking college preparatory classes was 1.75 and for full-time employment was 2.09. A student taking college prep was almost twice as likely to drop out as one not taking prep, while a student employed full-time was slightly over twice as likely to drop out as a student not employed full-time.

DROP2 Results

The results for dropping out after the second fall, DROP2, indicated that fall 1991 GPA, the writing placement test score, the mathematics placement test score, taking a college preparatory class, full-time or part-time enrollment, employment, full-time employment, and the race by full-time/part-time interaction were significant. The global effect of the race by full-time/part-time was a chi-squared value of 1.214 which was not significant for two degrees of freedom. No further investigations were conducted. The black versus Other racial contrast was calculated and again found to be non-significant.

The GPA, employment, and full-time employment for fall 1991(GPA2, FOUNDEM2, and EMPFT2) were included in this full-model analysis in an effort to determine if the value or status of these variables closer to the event was more important than the initial value or status. It was possible to include the GPA for fall 199i in this analysis since all of these students had been enrolled at that point in time.

The results for the main effects were consistent with those obtained for DROP1 for those variables that were significant for both outcomes. The two additional significant variables, the writing placement score and full-time or part-time enrollment, behaved in the anticipated manner with an increase in score for the writing segment of the MAPS placement test indicating increased odds of remaining enrolled as did full-time enrollment versus part-time. The odds ratio for the writing score was .97. For full-time or part-time enrollment, the odds ratio was .37. The effect of full-time employment was greater for DROP2 than DROP1, with an odds ratio of 3.15 compared to 2.09. The effect of college prep was also greater for DROP2 than DROP1, with an odds ratio of 2.06 compared to 1.75. The standardized odds ratios for GPA for fall 1991, the writing placement test score and the mathematics placement test score were .76, .83 and .87, indicating the effect of GPA was greater than that of the placement scores.

Transferred

The results for transferred compared to remaining enrolled, TRANS, indicated that the black versus white contrast, fall 1990 GPA, reading placement score, mathematics placement score, race by sex, race by full-time or part-time enrollment, and the taking college preparatory class by receiving financial aid interactions were significant.

The global effects of the three interactions were the chi-squared values of 5.417 with 2 df

for race by sex, 6.364 with 2 df for race by full-time/part-time enrollment, and 2.971 with 1 df for taking college preparatory classes by receiving financial aid. The global effect of the last interaction was not significant and no further analyses were not conducted. The global effects for the two other interactions were significant.

The calculated black versus Other by sex interaction was not significant. The only portion of the race by sex interaction that was significant was the effect of sex when limited to black students. The estimated parameter was .7932, with an odds ratio of 2.21. This ratio indicated that black males were slightly over twice as likely to transfer as black females.

The calculated black versus Other by full-time/part-time enrollment interaction was significant. The effect of full-time/part-time enrollment limited to blacks yielded a parameter estimate of 2.2956, with an odds ratio of 9.93. This indicated that full-time blacks were much more likely to transfer than part-time blacks. The effect of full-time/part-time enrollment when limited to Other students and the effect of Other versus white students when limited to full-time were also significant. Full-time Other students were much less likely than either part-time Other or full-time white students to have transferred to another higher education institution.

This was the only logistic analysis conducted in which the variables RACEL2 and PREAD were significant. RACEL2 represented the black versus white contrast. The odds ratio of .43 for RACEL2 indicated that black students were less likely to transfer than white students. The derived black versus Other contrast was not significant. The odds ratio for the reading placement score, PREAD, was approximately that of the mathematics placement score, with both functioning in a positive manner for remaining enrolled compared to transferring. This contrasted with some of the studies cited by Tinto (1975) which indicated that high ability students tend to transfer.

The standardized odds ratios for fall 1990 GPA, reading placement score and mathematics placement score were .88, .83 and .87. Thus for transferring, the reading placement score had a greater impact than either GPA or the mathematics placement score.

Stop Outs

The results for students who stopped out during the follow-up period, i.e., dropped out for fall 1991 but returned for fall 1992 - STOP, indicated that age, fall 1990 GPA, mathematics placement score, type of high school certification, full-time employment and the race by full-time/part-time interaction were significantly related to this outcome. The race by full-time/part-time interaction was similar to previous INDEX results, with the global effect being non-significant. The black versus Other racial contrast was calculated and found to be not significant. The Other versus white and black versus Other contrast were both significant. However, the global effect with a chi-squared value of 3.22 for two df was not significant. Therefore, no further analyses were conducted.

The odds ratios for fall 1990 GPA, mathematics placement score and type of high school certification were in keeping with those of the other sections of INDEX. However, the odds ratio for age indicated that as one grew older, they were less likely to stop out. This contrasted with the result for DROP1 which indicated as one grew older there was an increased likelihood of dropping out. The only variable positively related to stopping out compared to remaining enrolled was full-time employment. The standardized odds ratios for age, fall 1990 GPA and mathematics placement score were .82, .71 and .77. As with DROP1 and DROP2, GPA had the greatest impact.

Tables 2 and 3 present a summary of the significant variables for the different outcomes.

Table 2

Significant Results for INDEX

Remaining Enrolled Reference Category

	DROP1		DROP2	
Variable	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio
AGE	0.0403 ***	1.04	0.0218	
GPA1	-0.5988 ***	.55	0.0229	
GPA2			-0.5994 ***	.55
PWRITE	0.0156		-0.0254 *	.97
PMATH	-0.0494 ***	.95	-0.0546 ***	.95
DIP	-1.5050 **	.22	0.1702	
PREP	0.5613 **	1.75	0.7227 **	2.06
FTPT	-0.3768		-0.9892 ***	.37
FOUNDEM1	-0.7163 ***	.49	0.1165	
EMPFT1	0.7379 ***	2.09	-0.2694	
FOUNDEM2			-0.7812 ***	.46
EMPFT2			1.1480 ***	3.15
RL3FT	-25.5373 ***	1	-28.1853 ***	1

* p< =.10 ** p< =.05 *** p< =.01

1. Odds Ratio discussed in text

Table 3

Significant Results for INDEX

Remaining Enrolled Reference Category

	TRANS		STOP	
Variable	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio
AGE	-0.0422		-0.0766 **	.93
RACEL2	-0.8507 *	.43	-0.3798	
GPA1	-0.1951 **	.82	-0.5034 ***	.60
PREAD	-0.0645 **	.94	-0.0020	
PMATH	-0.0400 **	.96	-0.0795 ***	.92
DIP	-1.2236		-1.8451 **	.16
EMPFT1	0.0221		0.8573 ***	2.36
RL2S	1.0473 **	1	1.0591	
RL3FT	-28.8139 ***	1	-29.2089 ***	1
PRFA	-1.0539 *	1	-0.1045	

* p< =.10 ** p< =.05 *** p< =.01

1. Odds Ratio discussed in text

The need for each institution to develop its own attrition profile is illustrated by the results of the race by full-time/part-time enrollment interaction. The literature states that Hispanic students have the highest overall attrition rate of any major ethnic group (Nora, 1987). Yet for

this institution, Hispanic students had the highest probability of remaining enrolled. The Hispanic population served tends to be second or later generation from the original Cuban immigration of the 1960's to Dade County, Florida. This is a very specific group with very specific attendance patterns.

Length of Follow-up

One of the areas for further study is based upon the results obtained for different lengths of follow-up. Two categories of the dependent variable INDEX provide preliminary information on possible differences in significant variables related to the length of follow-up. DROP1 dealt with students who left after the first fall and DROP2 dealt with students who left after the second fall. The differences between DROP1 and DROP2 in terms of significant variables would appear to indicate that age and type of high school certification were important for the first year but not the second. Conversely, writing placement score and full-time/part-time enrollment appear to be important for the second year but not the first. However, caution must be used since these results were based upon comparing dropping out after the first fall to remaining enrolled and dropping out after the second fall to remaining enrolled. Thus, there was no direct comparison between the different drop out periods.

Summary

The full-model logistic results indicated that fall 1990 GPA and mathematics placement score were the most consistently significant variables throughout the entire study. The standardized odds ratios for fall 1990 GPA for INDEX ranged from .63 to .88. The range for mathematics placement score was .77 to .87 respectively. Employment was significant in three portions of INDEX. Working full-time negated the advantages of working at all. Students

working full-time were between two and three times more likely to drop out than students not working full-time.

While the mathematics placement score was the most consistently significant of the three segments of the MAPS placement test, the writing placement score was also significant for DROP2. Students taking college prep were about twice as likely to drop out as those not taking college prep. Beginning college with a regular high school diploma was very important the first year and not having to go part-time was important the second. Ethnicity, as a main effect, was significant only for black students when considering transferring versus remaining enrolled. It was significant via interactions for both the black and the Other categories. Full-time blacks were more likely to transfer than part-time blacks. The Other category contained only a small segment of the total student body, but sex and full-time/part-time enrollment appeared to be functioning differently or stronger for that segment than the remaining students. The members of this group who attended full-time were much more likely to remain enrolled than to drop out compared to white students, and males were less likely to remain enrolled compared to females.

In general, the study results were not unexpected. The students most likely to remain enrolled either at the college under consideration or in higher education were those that fit the profile of the traditional student. They were young, probably entering college directly out of high school. They worked, but did not work full-time or take college prep classes their first semester. They had a standard high school diploma, scored well on the math placement test, attended college full-time and had a good GPA. Students most likely to not return to either the college or higher education were older when they started, worked full-time, attended college part-time and took college prep classes the first semester.

The contribution of this study was a means of comparing the specific effect of these different variables in relationship to each other. Now a counselor will be able to help "at-risk" students understand that they are about twice as likely to drop out if they work full-time with all other factors being equal. First term GPA is extremely important and the college must ensure that each student is receiving the help needed in order to maximize this variable. This might mean suggesting that the student take additional remedial work prior to attempting college level classes.

As colleges work to develop intervention strategies, the implications of this profile for attrition must be kept in mind. They must be aware of the general needs of older students such as flexible class schedules, day-care, and workshops on time management and study skills. However, colleges must also realize that there are very distinct sub-groups contained within these general categories. The special needs of these sub-groups must also be addressed within college-wide retention plans. Colleges must recognize that the current clientele will remain enrolled only as long as both educational and environmental needs are being met.

Bibliography

Bean, J. P., & Metzner, B. S. (1985). A Conceptual Model of Nontraditional Undergraduate Student Attrition. Review of Educational Research, 55, 485-540.

Demaris, A. (1992). Logit Modeling Practical Applications. Quantitative Applications in the Social Sciences, 86. Newbury Park: Sage Publications.

Hosmer, D.W., Jr, & Lemeshow, S. (1989). Applied Logistic Regression. New York: John Wiley & Sons, Inc.

Nora, A. (1987). Determinants of Retention Among Chicano College Students. Research in Higher Education, 26, 31-59.

Tinto, V. (1975). Dropout from Higher Education: A Theoretical Synthesis of Recent Research. Review of Education Research, 45, 89-125.

Tinto, V. (1982). Defining Dropout: A Matter of Perspective. In E. Pascarella (Ed.), New Directions for Institutional Research: Studying Student Attrition (pp 3-7). San Francisco: Jossey-Bass.

Tinto, V. (1987). Leaving College: Rethinking the Causes and Cures of Student Attrition. Chicago: University of Chicago Press.

Windham, P. (1994). Factors Influencing Student Attrition in Public Community Colleges. Unpublished doctoral dissertation, Florida State University, Tallahassee.

Notes

1. Only significant variables are discussed in this paper. Results of the full-model analysis may be obtained from the author upon request.